Access Ratings for Buildings: A Novel Smartphone Based Evaluation & Intervention for Community Accessibility

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Abstract

Access Ratings for Buildings (AR-B) aims to develop a mobile and web-based system that will provide up-to-date accessibility information about public buildings for people with disabilities, their families and friends, and building owners. This system is divided into five components: Access Slope, Access Light, Access Sound, Access Tools, and Access Place Mobile and Web.

Background

People with disabilities face accessibility challenges due to various physical, sensory, and cognitive obstacles both while entering and maneuvering within community buildings. People with disabilities may not know about these barriers until they encounter them, which ultimately affects their level of participation in the community. These apps allow people to determine which establishments will best serve their needs, plan alternatives, bring assistance, or avoid particular barriers. AR-B is a collection of simple, portable evaluation and reporting tools that will enable building assessors to broadcast details about any building's accessibility.

Description

Access Slope (Figs. 1-4) is an app that allows users to measure the degrees, percent increase, and vertical:horizontal ratio of any ramp. There are four measurement options comprised of the run slope and cross slope of both the ramp and landing. (Fig. 1) The run slope follows the path of the ramp and the cross slope measures the slope along the width of the ramp. The device must be physically placed flat on the ramp for the measurements to be taken. Access Slope only requires three seconds to record each measurement. The results are ranked on a good access/poor access scale, taken from Americans with Disabilities Act (1990) requirements, which indicates the level of accessibility of the ramp. Users may add a location and description to each measurement. The app can store up to 50 measurements and at any point can be exported to a spread sheet, through email (Fig. 4).

Access Light (Figs. 5-8) is an app that measures the light of any environment and indicates the accessibility of the brightness level. There are three light options to choose from: task light, ambient light, and accent light (Fig. 5). For example: task light could be a desk lamp, ambient light could be a general well-lit room, and accent light could be a spotlight. Once a type of lighting is selected, a Post-it® note is used to cover the front facing camera of the device to allow for the most accurate results to be recorded. The sticky one-third of a Post-it® can be torn off and used to cover the camera. Simply place the device face up on a steady surface while the measurement is being recorded. Results are presented in two different graphs. The first graph is an x-y bar graph that shows the lux values recorded over the fifteen samples taken during the measurement (Fig. 6). The next results page shows the median lux as compared to lux standards of brightness (Fig. 7). A location and description can be added to each measurement. Access Light can hold up to 50 measurements and at any time these can be exported to a spread sheet, through email.
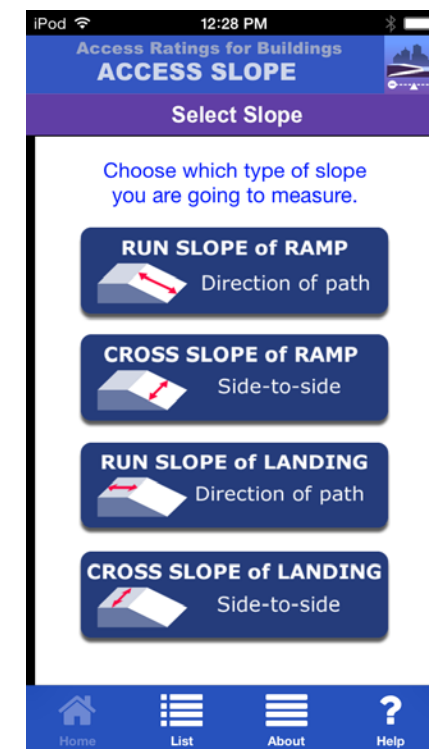

Fig.1: Access Slope Home Page. The first screen that appears when entering the app. There are four types of ramp measurements to choose from.
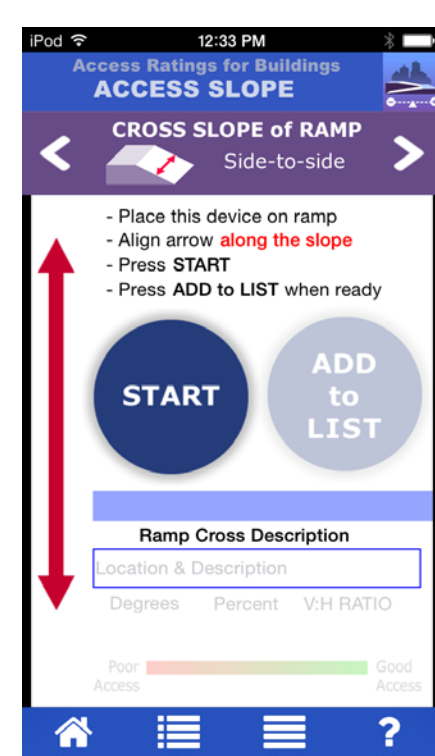

Fig. 2: The measurement screen of Access Slope. The type of slope is displayed at the top, along with directions, and the start button.
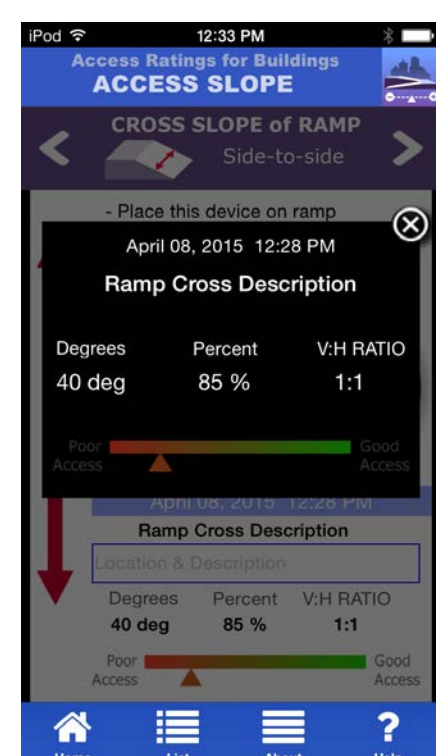

Fig. 3: The resulting slope data is presented: the degrees, percent, and vertical:horizontal ratio of the slope along with a visual representation of the ramp's accessibility
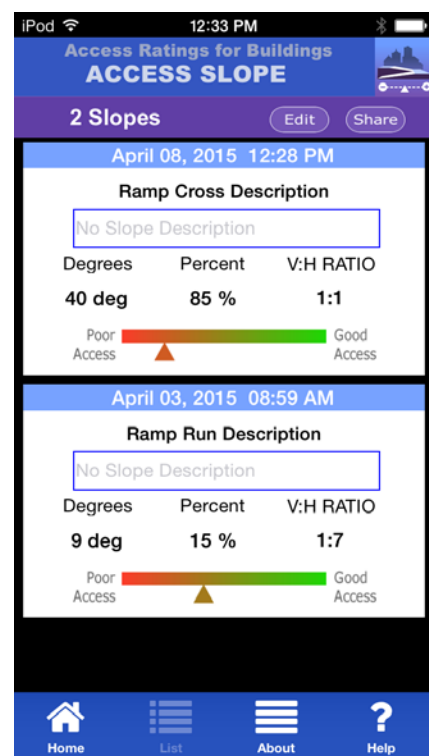

Fig. 4: List page where up to 50 slope measurements can be stored and exported into a spread sheet.
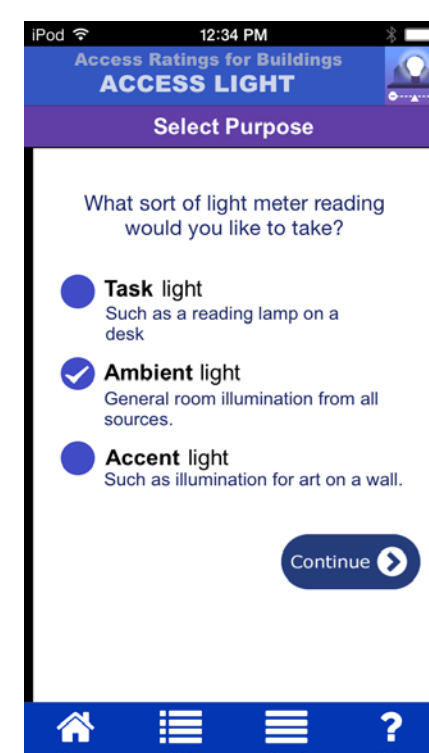

Fig. 5: Access Light Home Page. On this page the user can choose the type of light source being tested from three options.
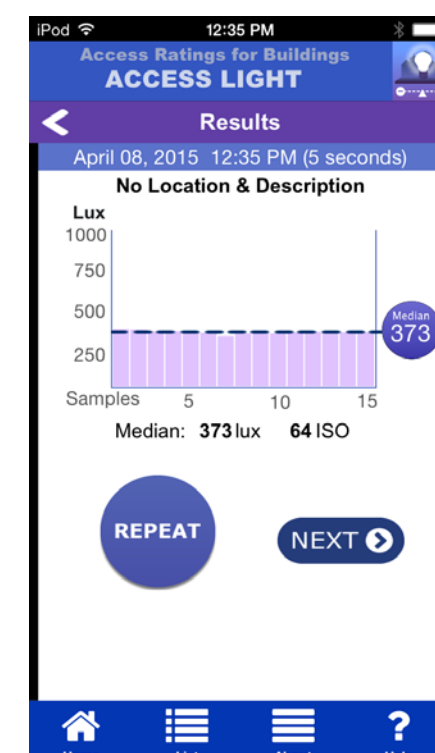

Fig. 6: First results page which indicates the median lux value over the fifteen samples taken in a graph form.

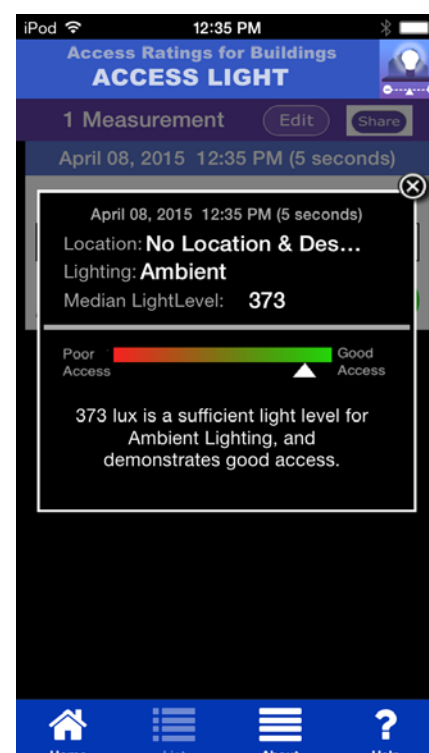Fig. 7: Second results page that relates the median lux measurement to a brightness scale.

Fig. 8: Results pop-up of light measurement. Indicates location, type of light, median lux, and the overall accessibility.
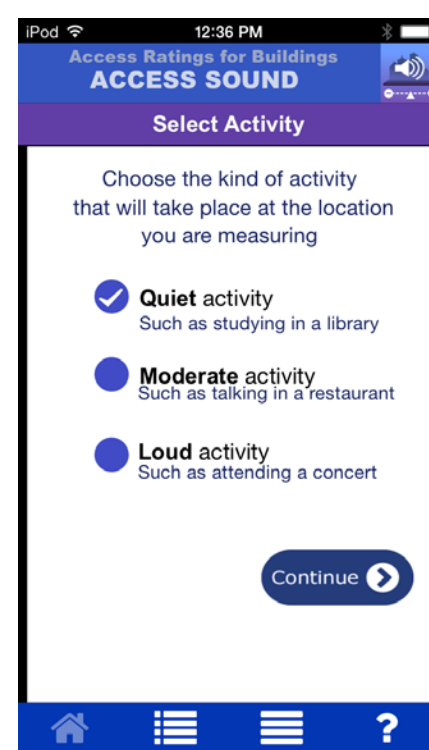

Fig. 9: Access Sound Home Page. Here there are three options of sound activity to choose from in order to take an accurate measurement.
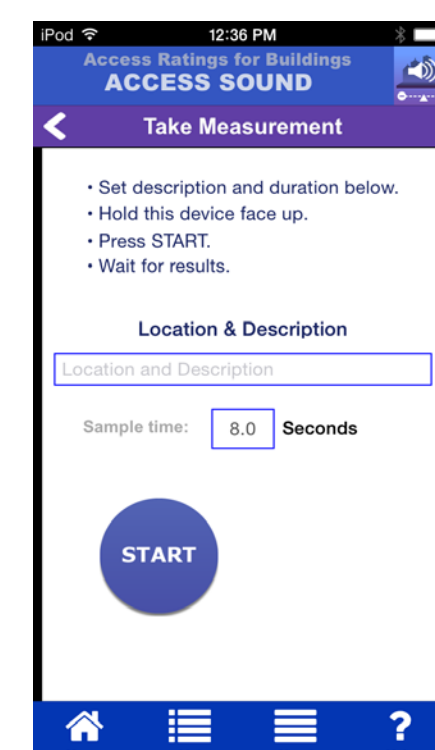

Fig. 10: The measurement screen of Access Sound includes instructions, a place to type a description of the measurement, the sample time, and the start button.
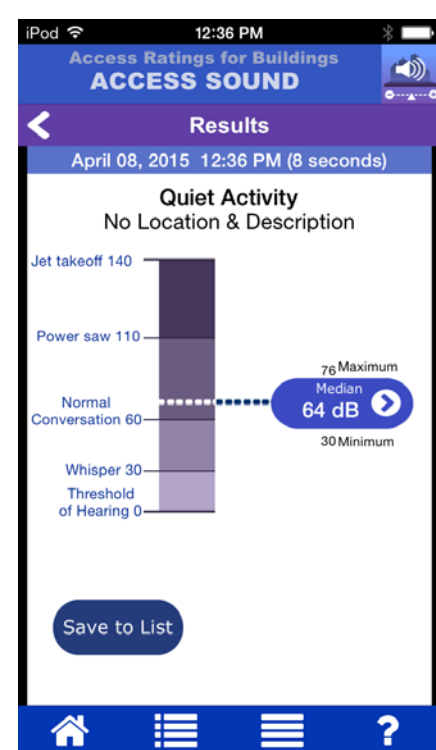

Fig. 11: Second results page where the median decibel level is compared to common environmental sounds on a bar graph.
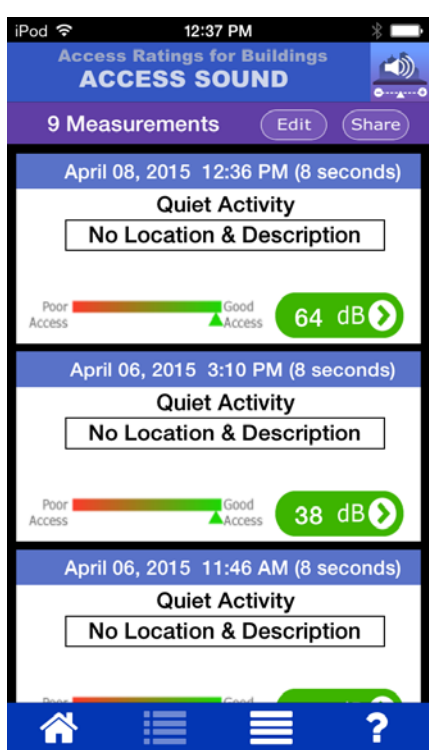

Fig. 12: List page where up to 50 sound measurements can be stored and exported into a spread sheet, if desired.

Access Sound (Figs. 9-12) is an app that measures the decibel (dB) level in any room and provides the accessibility information for the recorded level. There are three sound levels to choose from: quiet activity, moderate activity, and loud activity (Fig. 9). Quiet activity represents a library type environment, moderate activity is the tone of a normal conversation, and loud activity is similar to the tone of a concert or mowing the grass. The measurement is taken on a steady surface to avoid interference. Results are presented in two different graphs. An x-y bar graph illustrates the dB levels recorded over the fifteen samples taken throughout the sample time. The second graph shows the median, maximum, and minimum dB levels taken during the measurement, in comparison to common environmental sounds, in order to indicate the noise level. It is possible to assign each measurement a location and description (Fig. 11). Access Sound can store up to 50 measurements and at any point these can be exported into a spread sheet, through email (Fig. 12).

Access Tools (Figs. 13-16) incorporates twelve AUDITS into one mobile application so the accessibility features of entire buildings can be assessed. The features of buildings that can be evaluated are doorways, elevators, floor and ground, handrails, parking, ramps, restaurants, restrooms, routes, seating, signage, and stairs (Fig. 13). Users record details concerning each of these areas while out, or afterwards. Answers are presented in a trichotomous manner: yes, no, maybe, and not applicable (Fig. 14). The answer chosen for one question determines which question is presented next. For instance, if a certain standard is not met in one area, more specific questions are posed, however, if the area meets the standards, the app will skip subsequent questions. The results are recorded in spread sheet format which the user can share via email (Fig. 16).

Access Place (Figs. 17-18) is a multi-platform mobile and web application designed for end-users to communicate and obtain Personalized Accessibility Information (PAI) tailored to the individual's functional impairments. The user creates a profile (Functional Impairment Profile, Fig. 17) that allows the system to personalize the display of building information that is most relevant to their specific accessibility needs. The user may also view information provided by other people with disabilities and building visitors concerning the accessibility of various businesses. Reviews written by users with comparable profiles are sorted toward the top of the search list, and their ratings are given greater weight in correspondence to their level of similarity. This allows users to better prepare for environmental challenges they may face in a particular settings.
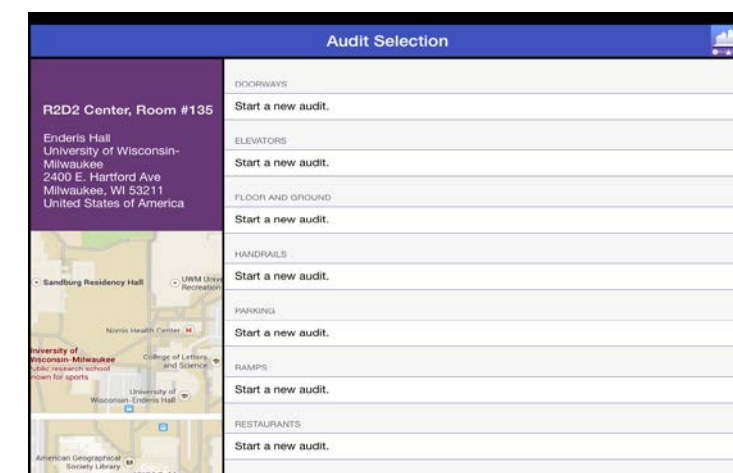

Fig. 13: Access Tools is comprised of several sections concerning the accessibility of businesses and community centers. Here the accessibility of an entire building can be evaluated and recorded.
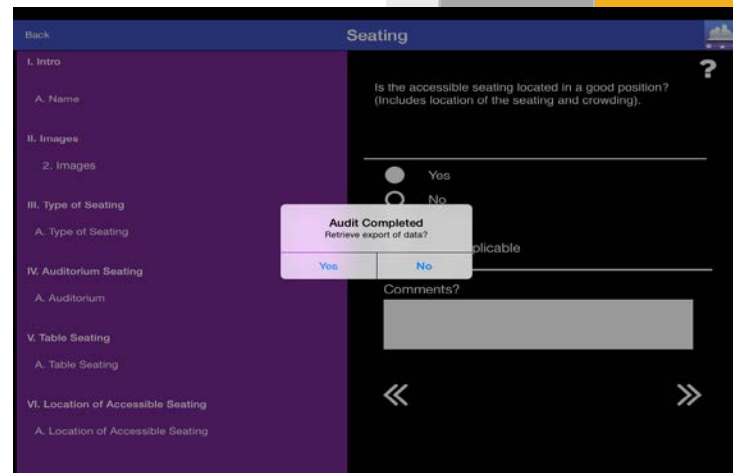

Fig. 16: Access Tools allows the user to export recorded information into a spread sheet and send it by email.
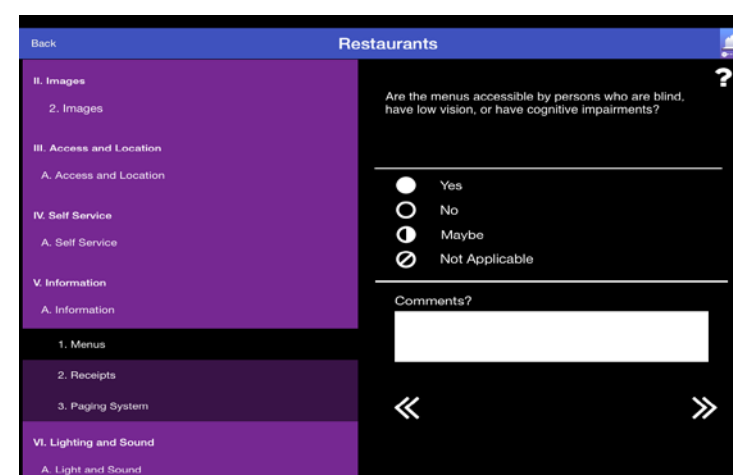

Fig. 14: Access Tools uses trichotomous questions (yes, no, maybe) to pinpoint the building's accessibility issues. Users can insert comments at any point throughout the audit for additional details.
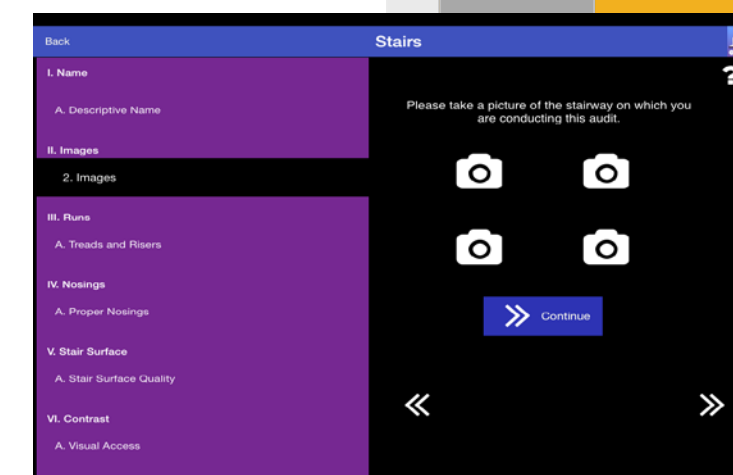

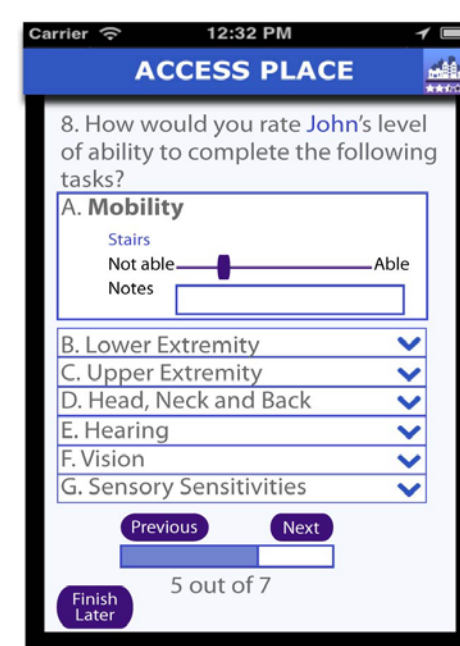Fig. 15: Pictures can be added into any audit to increase the detail provided.

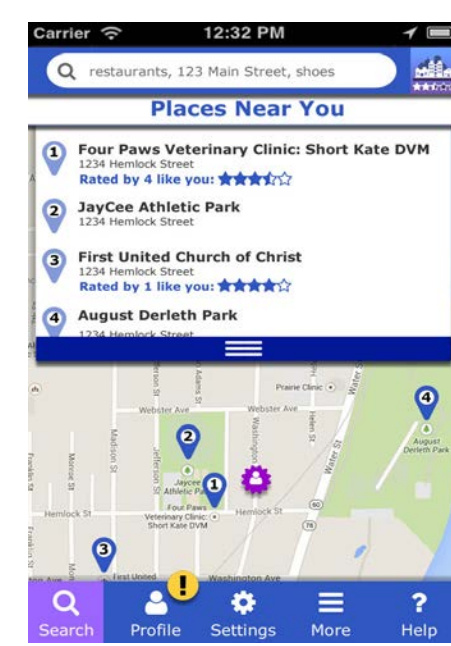Fig. 17: Functional Impairment Profile

Figure 18: Initial search screen populated with nearby places

References

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